
Generic Status and Lectotypifications for *Gymnospora* (Polygalaceae)

José Floriano Barêa Pastore* and Pedro Luís Rodrigues de Moraes

Programa de Pós-Graduação em Botânica, Departamento de Ciências Biológicas, Universidade Estadual de Feira de Santana, Avenida Transnordestina, Bairro Novo Horizonte, CEP 44.036–900, Feira de Santana, Bahia, Brazil

*Corresponding author: jfpastore@hotmail.com

ABSTRACT. *Polygala* sect. *Gymnospora* Chodat (Polygalaceae) is recognized at the generic rank based on recent phylogenetic evidence as *Gymnospora* (Chodat) J. F. B. Pastore with two new combinations, *G. blanchetii* (Chodat) J. F. B. Pastore and *G. violoides* (A. St.-Hil. & Moq.) J. F. B. Pastore. We also present a taxonomic key for species identification and argue that *P. blanchetii* Chodat should not be treated as a synonym of *P. pedicellaris* A. St.-Hil. & Moq. and that *P. pedicellaris* is better treated as a synonym of *P. violoides* A. St.-Hil. & Moq. (as *G. violoides*). Thus, the name *P. blanchetii* (as *G. blanchetii*) is established, in keeping with its traditional treatment. Lectotypifications are provided for the following five names: *P. blanchetii*, *P. laxa* Nees & Mart., *P. maritima* Vell., *P. pedicellaris*, and *P. violoides*.

RESUMO. *Polygala* seção *Gymnospora* Chodat (Polygalaceae) é reconhecida com status genérico, como *Gymnospora* (Chodat) J. F. B. Pastore, baseado nas evidências filogenéticas. Nós apresentamos duas novas combinações *G. blanchetii* (Chodat) J. F. B. Pastore e *G. violoides* (A. St.-Hil. & Moq.) J. F. B. Pastore, uma chave taxonômica para identificação das duas espécies e defendemos que *P. blanchetii* Chodat não deveria ser tratada como um sinônimo de *P. pedicellaris* A. St.-Hil. & Moq., enquanto que *P. pedicellaris* é melhor tratada como sinônimo de *P. violoides* A. St.-Hil. & Moq. (como *G. violoides*). Assim, o nome *P. blanchetii* (como *G. blanchetii*) é estabelecido, mantendo o seu tratamento mais tradicional. São também indicados lectótipos para os seguintes nomes: *P. blanchetii*, *P. laxa* Nees & Mart., *P. maritima* Vell., *P. pedicellaris* e *P. violoides*.

Key words: Brazil, *Gymnospora*, *Polygala*, Polygalaceae.

Gymnospora (Chodat) J. F. B. Pastore, here treated as a genus, was traditionally considered by Chodat (1893) and Paiva (1998), respectively, as a section or subgenus of *Polygala* L. (Polygalaceae). Currently, *Gymnospora* is comprised of two species that were included in *Polygala*, *G. violoides* (A. St.-Hil. &

Moq.) J. F. B. Pastore and *G. blanchetii* (Chodat) J. F. B. Pastore. A third species originally included in *Polygala* sect. *Gymnospora* by Chodat, *P. membranacea* (Miq.) Görts, is taxonomically excluded from *Gymnospora* because it lacks the diagnostic morphological features. *Gymnospora* is endemic to Brazil, apparently restricted to forest margins and savannas. It is characterized by the following set of characters: pubescent pedicels, pubescent and free external sepals, calyx persistent in frutification, noncrystate carina, puberulent and chartaceous capsules, and minute seed appendages or caruncles (Chodat, 1893; Marques, 1984). The caruncle, which is well developed in most other genera related to *Polygala*, can have a strong role in seed dispersal (Forest et al., 2007). The reduction of the caruncle and the flattened and membranous fruits suggest that *Gymnospora* is characterized by wind dispersal rather than by ants.

The generic status for *Gymnospora* is additionally supported by phylogenetic evidence (Forest et al., 2007). *Gymnospora*, represented by *G. violoides*, lies as sister to the *Badiera* DC.–*Hebecarpa* (Chodat) J. R. Abbott–*Phlebotaenia* Griseb. clade. All traditional sections or subgenera of *Polygala* are more closely related to other genera than they are to *Polygala*, e.g., *Acanthocladus* Klotzsch ex Hassk. and *Bredemeyera* Willd. Thus, using the criterion of monophyly, *Gymnospora* cannot be maintained within the genus *Polygala*. Analysis of sequence data from *G. blanchetii* has been challenging, because the extant material of the species deposited in the herbaria studied has been thus far inadequate for molecular studies (Pastore, pers. obs.). However, morphological characters shared by both species of the genus unmistakably support the similarity between species of *Gymnospora*.

After an analysis of the type collections of all relevant names, we conclude that there are two distinct species: *Polygala blanchetii* and *P. violoides*, with *P. pedicellaris* treated as a synonym of the latter. This is in agreement with the conclusions reached by Marques (1984).

I. *Gymnospora* (Chodat) J. F. B. Pastore, stat. nov.
Polygala sect. *Gymnospora* Chodat, Arch. Sci.
Phys. Nat. 25: 698. 1891. *Polygala* subg.
Gymnospora (Chodat) Paiva, Fontqueria 50(4):
147. 1998. TYPE: *Polygala violoides* A. St.-Hil.
& Moq.

IDENTIFICATION KEY FOR *GYMNOSPORA* SPECIES FROM
SOUTHEASTERN BRAZIL

- 1a. Flowers 6–8 mm; bract lanceolate, 1.8–2.2 mm long;
pedicel 2–6 mm long; ovary long stipitate
..... *G. blanchetii*
- 1b. Flowers 9–10 mm; bract deltate, 0.5–0.7 mm long;
pedicel 6–8 mm long; ovary short stipitate
..... *G. violoides*

1. *Gymnospora blanchetii* (Chodat) J. F. B. Pastore,
comb. nov. Basionym: *Polygala blanchetii*
Chodat, Mém. Soc. Phys. Genève 31(2): 88.
1893. TYPE: Brazil. Bahia: Ilhéus, 1836 (fl.), *J.*
S. Blanchet 2385 (lectotype, designated here, P
[barcode] 00733386; islectotype, G [barcode]
00359485, G [barcode] 00359486).

Polygala laxa Nees & Mart. in Wied-Neuwied, Nova Acta
Phys.-Med. Acad. Caes. Leop.-Carol. Nat. Cur. 12: 24.
1824, nom. illeg., non *Polygala laxa* Thunb., Prodr.
Pl. Cap. 2: 121. 1800. TYPE: Brazil. Bahia: “ad
flumen Ilhéus circa viam, quae est in Minas generales,
in silvis primaevis,” Dec. 1816 (fl.), *M. A. P. Wied-*
Neuwied s.n. (lectotype, designated here, FR-s.n.;
islectotype, BR-8526069, BR-8526991).

Polygala blanchetii has been reported principally
from southeastern Bahia near Ilhéus, although the
taxon was collected twice from other Brazilian states
(Minas Gerais and Rio de Janeiro). The species is
only known from 19th century collections, and an
extensive search in several regional herbaria (i.e.,
CEPEC, HB, HUEFS, and NY) did not uncover any
more recent material. Thus, it is assumed that this
species is likely extinct (Pastore, 2009). The
lectotype for *Gymnospora blanchetii* was chosen from
the obvious link between the original collector and
species epithet, based on the citation of the
herbarium on the original description, and it is also
supported by Chodat’s original handwriting on the
sheet label. *Polygala laxa* Nees & Mart. is an
illegitimate name, being a later homonym of *P. laxa*
Thunb. In spite of the fact that this was the first
species described in the *Gymnospora* group in 1824,
no subsequent references could be found in the
literature. Although the located specimens of *P. laxa*
Nees & Mart. were not annotated by Nees, the
specimen at FR is the only one that has been
annotated with “*Polygala laxa* N. et Mart. / Dec.
1816. Prinz Max v. Neuwied leg. / Am der Minas

Strasse im Urwalde,” which agrees perfectly with the
protologue and the information on the original label
by Wied at BR [barcode] 8526069.

Additional specimens examined. BRAZIL. s. loc., 1815–
1817 (fl.), *F. Sellow* 1016 (BM); s. loc., s.d. (fl.), *F. Sellow s.n.*
(CGE, K). **Bahia:** Ilhéus, *F. Sellow* 66 (BR, K); Ilhéus, “*Prof.*
Ambulante” [sic] 03 (R); ad Almada, “*Collector lignorum*” 03
(M [2]); in sylvis ad Almada, *C. F. P. Martius s.n.* (M).
Espírito Santo: Rio Doce, s.d., *Anonymous s.n.* [“communic.
Martius 1827,” probably collected by *M. A. P. Wied-Neuwied*
s.n. on Dec. 1815 or *F. Sellow s.n.* on April 1816, Moraes,
pers. comm.] (BM). **Rio de Janeiro:** s. loc., 1814–1815,
Sellow L 366 B 531 (M).

2. *Gymnospora violoides* (A. St.-Hil. & Moq.) J. F.
B. Pastore, comb. nov. Basionym: *Polygala*
violoides A. St.-Hil. & Moq., Ann. Soc. Sci.
Orléans 9: 55. 1828. TYPE: Brazil. Minas
Gerais: “Nascitur in sylvis primaevis prope
praedium Canna braba in parte orientali
provinciae Minas Geraës. Florebat Aprili,” s.d.
(fl.), *A. Saint Hilaire* 1003 Cat. B1 (lectotype,
designated here, P [barcode] 00733579; iso-
lectotypes, MPU [barcode] 012178, P [barcode]
00733580).

Polygala pedicellaris A. St.-Hil. & Moq., Mém. Mus. Hist.
Nat. 17: 322. 1828. *Polygala violoides* A. St.-Hil. &
Moq. var. *pedicellaris* (A. St.-Hil. & Moq.) Chodat,
Mém. Soc. Phys. Genève 31, pt. 2, no. 2: 88. 1893.
TYPE: Brazil. Minas Gerais: “Nascitur ad basim
montis Serra da Lapa in provinciã Minas Geraës.
Florebat Februario,” s.d. (fl.), *A. Saint Hilaire* cat. B2
2177 (lectotype, designated here, P [barcode]
00733585; islectotypes, MPU [barcode] 012177, P
[barcode] 00733581, P [barcode] 00733578).

Polygala maritima Vell., Fl. Flumin.: 293. 1829. syn. nov.
TYPE: Brazil. Fl. Flumin. Icon. 7: tab. 68. 1831.
(lectotype, designated here, in Vellozo [1831: tab.
68]).

Polygala pachyrrhiza Casar., Nov. Stirp. Bras. Dec.: 20.
1842. TYPE: Brazil. Rio de Janeiro: “Habitat in
collibus siccis circa Jurijuba et Piratininga, prope Rio
de Janeiro,” s.d., *G. Casaretto* 1918 (holotype, GE not
seen; isotype, G).

The lectotypes of *Gymnospora violoides* and *G.*
pedicellaris were chosen from the distinctive label on
the respective sheets, which have been associated
with the original description and illustrations provid-
ed by Saint-Hilaire (1829) (see also the comments on
Pastore et al., 2010). With respect to *Polygala*
maritima, there are few references to Vellozo’s
species available in the literature. Even Marques
(1979), who prepared a more recent treatment of
Polygalaceae for *Flora of Rio de Janeiro*, overlooked
Vellozo’s names. Indeed, several reasons could be
attributed for this omission. Many of Vellozo’s
collections have not been located (Carauta, 1973)

and may no longer be extant. His descriptions and plates (Vellozo, 1829, 1831, respectively) are often insufficient for diagnostic identification to the species level. However, *P. maritima* is one of Vellozo's species that can be unequivocally interpreted, mainly from its illustration, which presents some diagnostic characteristics such as the keel not being crested, the roots having tubercles, and all of the sepals being free. Vellozo's plate is here designated as the lectotype of *P. maritima*. Bennett (1874) misinterpreted *P. pedicellaris* and incorrectly applied the name to a specimen of what would later be described as *P. blanchetii* by Chodat (1893), even though Chodat treated *P. pedicellaris* as a variety of *P. violoides*. Bernardi (2000) evidently did not check the types either in Paris or Montpellier and followed Bennett's (1874) interpretation, treating *P. pedicellaris* as the correct name for *P. blanchetii*.

Additional specimens examined. BRAZIL. s. loc., s.d. (fl.), *F. Sellow s.n.* (BM). **Espírito Santo:** Rod. BR 101, 20 km S de Linhares, 16 Oct. 1983, *G. Hatschbach & O. Guimarães 46915* (C, CEPEC, INPA, MBM, MO, NY, RB). **Goiás:** Uruaçu, Faz. Amarra-Cachorro, 500 m abaixo da ponte sobre o Macaco, 6 Oct. 1992, *B. M. T. Walter et al. 2015* (CEN); Jataí, Faz. Matalta ca. 2 km da estrada Jataí-Caiapônia, 2 Oct. 1968, *S. F. Fônsaca & E. Onishi 1010* (UB). **Mato Grosso do Sul:** Bonito, Projeto Guaicurus, ca. 4–5 km N of Bonito, 9 Nov. 2002, *G. Hatschbach et al. 74978* (HUEFS, MBM, RB, SPSF, UB). **Minas Gerais:** Guarani, UHE, de Ponte I, Palestina II, 11 Oct. 1997, *A. Salino 3549* (BHCB); Lagoa Santa, prope Rio das Velhas, *J. E. B. Warming 425* (C); Viçosa, Faz. Sobrada, rd. to Cajury, 12 Nov. 1930, *Y. E. J. Mexia 5287* (NY). **Rio de Janeiro:** near Rio Comprido, Aug. 1836, *G. Gardner 174* (BM, CGE, K); Rio de Janeiro, *C. Gaudichaud-Beaupré 696* (BM, G, K, P). **São Paulo:** São Paulo, *G. Perdonnet 14* (S).

Acknowledgments. The authors express their gratitude to Ray Harley for suggestions on early versions of the manuscript and also to reviewers Bente Eriksen and Richard Abbott for their very helpful comments on the revision. We are also grateful to Victoria Hollowell for the excellent edits and send our thanks to Stefan Dressler (FR) for informing us about the original gathering by Wied-Neuwied housed in his institution. J. F. B. Pastore acknowledges Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq) for a postdoctoral fellowship and scholarship, and P. L. R. de Moraes acknowledges the Program PRODOC of Fundação de Amparo à Pesquisa do Estado da Bahia (FAPESB)/CNPq for a scholarship (proc. # 35.0263/2007.8).

Literature Cited

- Abbott, J. R. 2011. Notes on the disintegration of *Polygala* (Polygalaceae) with four new genera for the Flora of North America. *J. Bot. Res. Inst. Texas* 5: 125–137.
- Bennett, A. W. 1874. Polygalaceae. Pp. 1–82 in C. F. P. von Martius, A. W. Eichler & I. Urban (editors), *Flora Brasiliensis*, Vol. 13(3). F. Fleischer, Leipzig.
- Bernardi, L. 2000. Consideraciones Taxonómicas y Fito-geográficas Acerca de 101 *Polygalae* Americanas. *Cavanillesia Altera*, Vol. 1. Real Jardín Botánico, Madrid.
- Carauta, J. P. P. 1973. The text of Vellozo's *Flora Fluminensis* and its effective date of publication. *Taxon* 22: 281–284.
- Chodat, R. H. 1893. *Monographia Polygalacearum*. *Mém. Soc. Phys. Genève* 31(2, 2): 1–500.
- Forest, F., M. W. Chase, C. Persson, P. R. Crane & J. A. Hawkins. 2007. The role of biotic and abiotic factors in the evolution of ant dispersal in the milkwort family (Polygalaceae). *Evolution* 61(7): 1675–1694.
- Görts-van Rijn, A. R. A. 1974. Notes on Polygalaceae from Suriname. *Acta Bot. Neerl.* 23(2): 189–191.
- Marques, M. C. M. 1979. Revisão das espécies do gênero *Polygala* L. (Polygalaceae) do Estado do Rio de Janeiro. *Rodriguésia* 31(48): 69–339.
- Marques, M. C. M. 1984. Polígalas do Brasil—III. Seção *Gymnospora* Chod. do gênero *Polygala* L. (Polygalaceae). *Rodriguésia* 36(60): 31–34.
- Marques, M. C. M. & A. L. Peixoto. 2007. Estudo taxonômico de *Polygala* subgênero *Ligustrina* (Chodat) Paiva (Polygalaceae). *Rodriguésia* 58(1): 95–146.
- Paiva, J. A. R. 1998. *Polygalarum africanarum et madagascariensium prodromus atque gerontogæi generis Heterosamara Kuntze, a genere Polygala L. segregati et a nobis denuo recepti, synopsis monographica*. *Fontqueria* 50: 1–346.
- Pastore, J. F. B. 2009. Polygalaceae. Pp. 342–345 in A. M. Giuliatti, J. M. C. da Silva, A. Rapini, L. P. de Queiroz & M. J. Gomes de Andrade (editors), *Catálogo de Espécies de Plantas Raras do Brasil*. Conservação Internacional and Universidade Estadual de Feira de Santana, Belo Horizonte.
- Pastore, J. F. B., D. B. S. O. Cardoso & G. A. Aymard C. 2010. A synopsis, new combinations, and synonyms in *Acanthocladus* (Polygalaceae). *Novon* 20: 317–324.
- Saint-Hilaire, A. F. C. P. 1829. Polygalaceae. Pp. 5–75 in A. F. C. P. Saint-Hilaire, A. Jussie & J. Cambessèdes (editors), *Flora Brasiliae Meridionalis*, Vol. 2. A. Belin, Paris.
- Vellozo, J. M. da C. 1829 [1825]. *Florae Fluminensis, seu Descriptionum Plantarum Praefectura Fluminensi Sponte Nascentium Liber Primus. Ex typographia Nationali Flumine Januario*, Rio de Janeiro.
- Vellozo, J. M. da C. 1831 [1827]. *Florae Fluminensis Icones. Ex off. Lithogr. Senefelder, curanti J. Knecht*, Paris.
- Verkerke, W. 1985. Ovules and seeds of the Polygalaceae. *J. Arnold Arbor.* 66: 353–394.